season of tornadoes in the Mississippi Valley extends from April to September, inclusive.

Q. In case a cyclone cellar is not available, what, in your estimation, would be a safe place?

Ans. The southwest portion of the cellar of a frame house.

Q. What about cellars in brick buildings during such storms; are they safe?

Ans. That depends entirely on the severity of the tornado. Some tornadoes merely destroy the roof of brick houses; some cause the walls to crumble or fall outward. The cellar of a brick house is probably safer than any other place in that particular structure. In the Omaha tornado of March, 1913, very few brick houses were seriously damaged.

Q. What time of day do these storms occur?

Ans. Generally from 3:30 to 5 p. m.

Q. Have there been any at night?

Ans. Yes.

Q. Have the municipalities any way of notifying the people, and how?

Ans. The place where a tornado will form can not be foretold. Tornadoes, like thunderstorms and hailstorms, occur, for the most part, on warm, sultry afternoons, in the late spring and in summer. While the precise path of these storms can not be accurately foretold, the weather maps show when the conditions are favorable to their generation.

The local signs of the approach of a tornado are ominous clouds, first in the southwest and then almost immediately in the northwest and north. The appearance of a pendant funnel-shaped cloud may be taken as conclusive evidence of the presence of a tornado. If a funnel cloud can not be observed, its existence can be known by a peculiar roaring noise, somewhat like the rumbling of distant thunder or the approach of a train of heavy cars.

If one can see the tornado cloud and gain an idea of its direction of motion, then the zone of safety is in a line at right angles to the direction of motion. If the tornado is moving toward the northeast, then one should run toward the northwest, provided, of course, the storm is about to move a little to the south of the observer's position.

The southern margin of a tornado is more dangerous than the northern, and one should take advantage of this fact in the endeavor to reach a place of safety, remembering that usually the width of the path of great destruction does not cover more than a couple of city blocks and that comparative safety may be found only a short distance at right angles to the line of advance of the tornado.

DETERMINATION OF OZONE AND NITROGEN OXIDES IN SOUTHERN INDIA.[2]

By F. L. USHER and B. S. RAO.

[*Reprinted from* Science Abstracts, Sect. A, Oct. 31, 1917, §1094.]

The more rapid decay of rubber articles and textile fabrics in the Tropics generally is ascribed to the intense light and heat, and the supposed higher percentage of ozone, hydrogen peroxide, and nitrogen oxides in the tropical atmosphere. As there are hardly any reliable data concerning these percentages, the authors undertook this determination at Bangalore College in southern India (Mysore). Rothmund and Burgstaller have shown that the potassium iodide method of estimating ozone and hydrogen peroxide is untrustworthy, they rely on the oxidation by ozone of alkaline or neutral sodium nitrite to nitrate, and they let the air to be analyzed replace water, instead of bubbling it through water. The air is sucked through tubes charged with chromic acid (which destroys H_2O_2) and MnO_2 (neither of these two reagents attack nitrogen peroxide).

Only 14 complete determinations have been made so far, and in 12 of these none of the three gases were found; twice nitrogen peroxide was observed, 1 part in 4,000,000 or 5,000,000 of air. Conclusions are not yet drawn, but it is pointed out that apparently ozone and nitrogen peroxide never occur together in the atmosphere, probably because they would react with one another under formation of nitric acid.—*H. B[orns]*.

[2] Trans., Chem. soc. J., Aug., 1917, 111: 799–809.

PITFALLS OF METEOROLOGICAL PERIODICITIES.

By W. W. B[RYANT].

[*Reprinted from* Nature, London, Nov. 29, 1917, 100: 246–7.]

There is a real danger that some meteorologists, resenting the accusation frequently made against them of accumulating masses of data without making any real use of them, may be tempted to apply the processes of mathematical analysis to any and every set of observations, regardless of the considerations which limit the suitability of the method for the particular data proposed for analysis. This may easily be the case when hunting for periodicity. There is a great temptation, especially for anyone accustomed to the regularity of so many cosmic phenomena, such as eclipses, comets, planets, etc., to expect to find such periods recurring in the weather, but the work before us, consisting of the essential portions of a dissertation by Dr. Ryd—fortunately thought worthy by Capt. Ryder, director of the Danish Meteorological Institute, of a wider publication and so included in the Communications of the Institute and done into intelligible English—should be studied before much time is spent in the search.[1]

Dr. Ryd sets out clearly certain characteristics of meteorological data, wherein they differ essentially from e. g., astronomical data. One of these is the impossibility of eliminating some forms of "systematic" error, which are too likely to be variable to be strictly systematic, such as the difference between the indications of a thermometer, under various conditions of exposure, and the real temperature of the air. Another is an error neither accidental nor systematic, but due to the fact that the data are meteorological; a good example of this is afforded by the mean diurnal variation of air temperature as shown on (*a*) overcast or (*b*) cloudless days.

Dr. Ryd regards harmonic analysis applied to such data as an excellent interpreter, but a very untrustworthy probe. The known periods—the day and the year—are unexceptionable, and the variation from hour to hour in one case, and from day to day, or preferably from "pentad" to "pentad," in the other, are obviously fit subjects for analysis. Dr. Ryd prefers to use both sine and cosine terms instead of the usual transformation, because the determination of mean error is more direct when two constants enter similarly. This is clearly important, as the mean error is a vital consideration. Analysis for testing a real period, such as one of the lunar periods, on the meteorological data is not quite so risky as tentative fishing for an unknown period, in

[1] Publikationer fra Det Danske Meteorologiske Institut Meddelelser. No. 3, "On Computation of Meteorological Observations, by *V. H. Ryd* (Copenhagen, 1917).